addresses by Owen & Huxley - worth keeping

SESSION 1866-67.

PROSPECTUS

OF THE

ST. MARY'S HOSPITAL

Medical School,

WITH

ADDRESSES

BY

THE ARCHBISHOP OF YORK, PROFESSOR OWEN, D.C.L., F.R.S.,

AND

PROFESSOR HUXLEY, F.R.S.,

On MEDICAL EDUCATION.

Communications to be addressed to the Dean of the School, from whom particulars may be obtained on application, either personally or by letter, and who will furnish the Names of Gentlemen, in Practice in the Neighbourhood of the Hospital, willing to receive Pupils to reside with them.

Information may also be obtained from any of the Lecturers.

ERNEST HART,
Dean of the School.

St. Mary's Hospital Medical School.

DISTRIBUTION OF PRIZES, 18th JUNE, 1864:

An ADDRESS by the

ARCHBISHOP OF YORK.

Mr. Dean, Ladies, and Gentlemen, Having concluded a very pleasant part of my duty, (the distribution of Prizes,) I now proceed to address a few remarks to you upon a subject with which I am afraid I must at once confess that I am by no means deeply conversant. At the same time, having passed the best years of my life in the work of education, in an eminent place of learning, I have, of course acquired an impression as to the methods of education, and it is not impossible that some light may be thrown on the present discussions with regard to medical education by one who approaches from a totally different point of view, and who brings to bear on them observation adduced from a totally different class of studies. I have passed my life in the University of Oxford, and there the system of teaching is essentially a mixed system. We have professors who, in their different lines, I believe it will be admitted, are second to those of no University. But the staple education of the place does not proceed from these professors. We have besides, scattered through all the Colleges, a class of persons called tutors, upon whom, in reality, devolves the real work of education. I am not for a moment depreciating the labours of the professors—far from it. The function of the professor is this, that he takes under his charge a particular subject, works at that, carries his studies in it as far as he can carry them, and gives lectures in it to all who approach him. The consequence is, that he undoubtedly keeps up the standard of his particular subject in the place. It happens, therefore, that very frequently an eminent professor will see gathered in his lecture-room as many tutors as pupils The lectures of the professor are usually fixed when the College lectures are not going on, because the College tutors themselves are quite willing to come and sit at the feet of the professors, and keep up their knowledge of the subject, perhaps without any ulterior object, but from the mere pleasure of hearing an able man discuss and explain that with which he he is most conversant. Now I come—and I think it will be admitted to bear upon the studies of a place like this—to explain what it is the tutor does. I have got a kind of impression—it may be quite wrong, so that every word must be taken for what it is worth—that the system of medical education, here and everywhere, is somewhat too much of a professorial character, and too little tutorial. I will now explain what the tutor does. I have said that the professor takes in hand his particular subject. I will now say that the tutor takes in hand not so much a particular subject as a particular man. The tutor is a person who looks after the education of the pupils. No doubt he knows every subject of the whole course, every word which is spoken in the lecture-room; but the object of the tutor is not the same as that of the professor, who knows his own subject better than anyone else, is acquainted with the latest discoveries in it, and can explain them in the most graceful language to his audience. The business of the tutor is a totally different one. He assembles round him a small number of men. The number varies according to the attraction of the subject, from five to perhaps as many as twenty in a class; though twenty is above the average, and is reckoned at Oxford rather an unwieldly class. He gathers these men round him in a room, opens a text book, and explanations out of this book are given; but from the very first, questions to the pupils go hand in hand with explanations from the tutor. In this particular thing lies the point and essence of the whole system—in the particular fact that the attention is what I may call active attention, as distinguished from passive attention, from the very first. No sooner has a man had a quarter of an hour's instruction from me than I ask him for some return in the shape of questions to which he has to give answers to me. The term lasts for eight or nine weeks, and a particular subject or section is exhausted in the course which takes place. When a term is drawing towards an end,—I am supposing myself in the position of a tutor,—I can single out the man who knows the subject very well from the average man; or, at the other end of the scale, from the man who requires a little whipping and spurring to bring him up to the average level. It is plain that the treatment of a conscientious tutor of those three classes of men will be quite different. With those who are behind he has to speak to them privately, warn them, and put them in the way of reading something extra, so as to make up lee-way. With those who are in advance he takes the greatest possible pleasure in carrying them a little higher in the subject. He has them in his room, and over the tea-table explains things which they ask him, or which he wishes to put before them; or he takes them out for a walk along the banks of the river, and turns the walk into a kind of peripatetic lecture; so that you see he has from the first not so much the charge of the subject as charge of the men who are doing the subject. I am afraid perhaps that I am prejudiced in favor of this method; but I am quite sure that this kind of active attention is very easy on the part of the pupil, whereas—and this I would commend to the consideration of those who have had more experience than myself here—what I call passive attention, the attention which receives and gives nothing back, is extraordinarily difficult to maintain. I could not undertake to sit on this hot day for two or three hours in succession, and listen even to the most brilliant lecturer, remaining passive the whole time, and say that at the end I could remember all that he had told me, or even half of it. In fact, if I were one of a large attendance at lectures, I would not undertake to say that some of those listeners might not towards the end have declined into sleep. Such a state of things would have nothing to do even with the brilliance of the lecturer. It is a law of nature that my mind can be acted upon if it is allowed to react. If you asked me to put myself into a kind of trance, and be acted on solely, I should be disposed to say, "Give me a little of that, and then allow me in my turn to act, because a passive state is not natural." You will observe no doubt, that I am taking a very one-sided view of the subject. I am maintaining the cause of the tutorial system wholly against that of the professorial system; and why? Not that I do not see great advantages also in the professorial system of other kinds, but that I do think, on the whole, for a place where subjects are to be taught to the average run of men, where you consider the man more than the subject, the tutorial system, in some of its modifications, is the system most profitable to be employed. I have heard from your excellent Dean that the number of lectures given to the students is extremely great. I forgot how many in the week the student is expected to attend.

The Dean: From fourteen to twenty-one.

The Archbishop: From fourteen to twenty-one in the week! That is something exceedingly great. At Oxford, where the lectures, I think, are easier, we consider twelve in the week a very good average; and at the end of a student's course, he will often come to the tutor and say, "I am pursuing my own studies, reading this and that book, and have attended lectures on this and that subject before; could you not let me off the lectures which call me out of my room and interrupt my course of study considerably?—could you not trust me a little by myself during my last term?" It is a peculiarity of the system that when a man is known to be at work, and comes to his tutor and says, "This is my last term. I am going up for examination next term, and I wish to be excused some of the lectures," his request is granted as a matter of course. You will see that there is a very great difference between your system and ours with respect to the number of lectures. I confess my ignorance of the whole matter as regards you; but still having formed my own impressions of human nature, I am disposed to say a word in favour of *mercy* with regard to the number of lectures. (Cheers.) I said just now that it seemed to me almost impossible that a man could sit three or four hours constantly receiving and giving nothing back without wasting a considerable portion of that time. I believe that the habit of attending lectures is not a thing given by nature. It must be acquired; and I do not know that we are always willing to give much trouble to acquire it. The consequence is that a good deal of information which is poured in must bubble out again, and be entirely lost. It seems to me quite possible that a hint from our system may profitably be taken by an excellent institution such as this is. Be sure that the minds of the young men are in active operation; and then, when you know your men,—when the tutor can see that they are doing their work in his section or class,—let him trust them a little more, and not exact so many lectures. (Cheers.) Of course it is understood that the lecturer knows what they are doing when they are not in his room, and still in the way of the subject. The lecturer should have a kind of picture of each of the pupils in his mind, and be able to say of them, " This is an active man, who can take care of himself. This man wants a little whipping up; I must privately lead him on. This man is very idle; I must give him warning." When we have got that kind of picture of each man in our minds, it is not necessary to chain and fetter by lectures quite so much. But observe, what I would put in the place of a number of lectures is the constant habit of examining the men in what they have been doing. (Cheers.) I do not mean that kind of examination in which the lecturer would make a return of the twenty, thirty, or forty marks which each pupil had obtained for his examination. I mean that preliminary kind of examination for the satisfaction of the lecturer only, that he may see what his class are really doing. He should begin by examining them on the first day. It is quite possible that in this way he will, by some question that he puts, demonstrate to a young man that whereas he thought he had been listening, he really had not. I am persuaded that this habit of examination, this turning the attention from passive into active attention, is a most important instrument in the way of study. I do not for a moment expect that hints like these, given so crudely, and coming from quite a different element, should have great authority here; but still they will throw out seeds of thoughts which may hereafter be fruitful. (Cheers.) If I am not mistaken, there are even stronger reasons, in regard to the studies pursued here, for leaving the students somewhat to themselves, than with regard to us at Oxford. Our business is with books, and when a man is summoned to lectures, he can put a mark on the book he is studying, come back, and take up the subject where he left off. Nothing is changed after his lecture is over. But I take it, though I know but little of chemistry, that in the case of chemistry you cannot leave all your test tubes and retorts simmering and fizzing, go off to lectures and return, without a certain and interruption and loss of time and material, and without a certain fret and worry of one's thoughts. I presume the same is the case with regard to dissection, and to a certain extent, with regard to everything requiring the use of hands and instruments. If you can trust your pupil, and be sure that he is at work, better let him do it, and not tease and worry him to come backwards and forwards to be instructed. These are the only hints I am disposed to give on the subject of education. I would commend to those persons, for whom I have the greatest respect as a class, who are instructing our youth in the most important science of medicine, to consider whether the tutorial system does in fact supply the most important want which is beginning to make itself felt in the system pursued here.

His Grace then proceeded to discourse with remarkable eloquence and force upon the difficulties of medical science, the necessity for something more than mere physical education, and expressed his desire that every medical man should fulfil his duties with a sense of devoutness, and a willingness to say " a word in season," which might make him, in time of necessity, the minister of even more than corporeal consolation.

St. Mary's Hospital Medical School.

DISTRIBUTION OF PRIZES, MAY 29th, 1865:

An ADDRESS by

PROFESSOR OWEN, D.C.L., F.R.S.

Mr. Dean, Ladies, and Gentlemen, I have been honoured by the request, through the Dean of your School of Medicine, to deliver to the successful competitors the prizes which they have gained by excellence and proficiency in the studies of this school; and here, at the outset, I am led to note the sound judgment which has governed the definition of the field of competition. With a few exceptions, prizes are not awarded for single courses; but classes are grouped in accordance with the curriculum laid down for students of the first and subsequent years; the object being to ensure the general proficiency of the students of each year in their respective subjects of study. I am happy in being permitted to take part in an assemblage and on an occasion that have for their essential cause and condition the increase and diffusion of knowledge. I am favoured in being the instrument of manifesting the satisfaction which the teachers of science in this school feel in the success which proficiency testifies to their endeavours to impart such science. I am glad also to meet fellow-learners of every grade, whose main aim and labour profess to be to gain those steps in science which may lead them to a height whence, in their turn, perhaps, they may discern the signs by which our view of the field of knowledge may be expanded.

In every race, one wins, or a few gain prizes; but every competitor has earned in the course what far transcends in value the mark of some small relative superiority. In the training or preparation for mere physical excellence, the muscular fibre is strung, the capacity of respiration developed, the vigour of circulation increased, the whole bodily health improved; the organism is a better organism, can do greater things, can receive higher enjoyments. But these perfections subside with the cessation of the exercises that educed them. Yours has been a competition of a higher kind; not of the powers of the animal, but of those of the man; not of the body, but of the mind; and the gain in the training and very act of competition must have been proportionate. Moreover, in the friendly endeavours to excel in which you have been engaged, you have done more for your own advantage and that of mankind than merely improve the working of your own intellects. The very exercises by which the acquisitivity of ideas, retentivity of facts and principles, power of comparison of grounds for this or that conclusion—in short, any of the faculties of apprehending truth, have been improved or educed; have left you in possession—permanent possession, let us hope—of the elements of anatomy, physiology, chemistry, zoology, botany, and other definite kinds or sums of natural science, which go to endow you with the faculty of comprehending the nature of injuries and symptoms of disease, and of applying that power in behoof of your suffering fellow-men.

Now, the lowest amount of this intellectual wealth which may have been gained and garnered by the student is to him a prize far exceeding in value the signs and tokens of honour which I have had this day to distribute. Let not, then, any of the so-called "unsuccessful" repine or feel discontent at the issue of the competitions. He has gained a better possession, in whatever measure he may have mastered the sciences which he has had the opportunity of learning; he has succeeded in a far higher matter, if his conscience tells him he has done his best, and has neither wantonly nor wilfully thrown away his opportunities. As our great poet sings :

> "Fame is no plant that grows on mortal soil,
> Nor in the glistering foil set off to the world, nor in broad rumour lies ;
> But lives and spreads aloft in those pure eyes and perfect witness of th' all-judging Jove :
> As he pronounces, lastly, on each deed,
> Of so much praise in heaven expect thy meed."

But, to descend from these heights to things of less empyreal concern : let me congratulate you on your being students of St. Mary's Hospital and School of Medicine, and show cause of congratulation by reference to the opportunities, arrangements, and conditions which it affords for a sound and thorough scientific and practical medical education.

[The chief characteristics of these were then defined and commented on.]

It is sometimes asked, Is medicine a science ? This question, like many others, is hardly reasonable or fair, the two terms being so unequal in degrees of complexity. So far as medicine knows the cause and condition of a curable disease, and the one infallible cure, to that extent it is "science." If medicine has mastered the nature ef a specific malady, if there be a specific malady, and has discovered the specific remedy, if there be such a thing as a specific, it may claim to be a science. I leave to the experienced practitioner to determine what may be the proportion of the field of observation and practice commonly called "medical science" which is in the above defined condition ; and what the proportion of that field in which the cultivators differ in their views as to the cause, the nature, and the remedy of disease.

Your excellent professor of chemistry will tell you that, having a special aim in view, he adds a certain re-agent to a given solution or mixture, knowing that it will produce such desired result, viz., a certain infallible decomposition and recomposition. The prevision and its fulfilment prove that he possesses a science. But, were other chemists to affirm that a different reagent would produce the same result, or that the solution, if left to itself, would produce it by spontaneous decomposition or recomposition ; and if there were really grounds for such affirmations or diverse views of the case,—you would then conclude that chemistry had not reached the scientific stage, and would hardly expect it to enjoy public confidence.

In fact, we see at the present day that the public confide not so much in medicine as a science as in the particular practitioner. It is characteristic also of the present phase in the growth of medicine, that the public are liable to be deluded and led astray by its shams ; and not until medicine becomes a science can such simulacra be expected to vanish, and quacks and quackery to become extinct. Time was when disasters were deemed, in the literal sense of the term, to be the effect of malign influence of stars. Two or three centuries ago, the horoscope was cast, and believed to indicate the future destinies of the heir, by the same classes as now accept, in like faith, the infinitesimal globule. The astrologer then had leave to move in the same social scale, and to sit at the same tables, as now the homœpathist. Astronomy had not risen to its full development as a science. It is interesting, indeed, to consider how a public, ignorant of and careless about the grounds and proofs of an established science, does in time come to believe in and trust it, to the exclusion of its simulacra, and the utter deposition and extinction of the quack professors of the same. I believe the public gain this faith by what the true science effects, and what it predicts.

By means of the data of astronomy, the seas are navigated, and remote parts of the earth reached with marvellous exactitude. Astronomy foretells phenomena to the day, hour, minute, even second of time : the interval— it may be years—after the prediction passes ; and at the very hour, and fractional part of the hour, the event foretold comes off.

The palæontologist, from a fossil fragment, infers that such a form of animal, strange, it may be, or gigantic, has existed in such an island ; and commits himself to a prophetic sketch of the same. Other parts are afterwards found ; at length, perhaps, the entire skeleton. The public knows nothing of the laws of correlation by which the prevision of a form of life long passed away, and never seen by human eye, was gained ; but it is struck by the fulfilment, and accepts or believes in the science.

Medicine is occasionally called upon to prophesy in public : the rank of the patient requires a bulletin. Reference to some of these series of predictions and the actual results may partly account for the degree in which medicine still halts, as a science, in public estimation. And so it comes to pass that the question continues to be asked, "Is medicine a science?"

The great question for you, however, is—Can medicine become a science? From every analogy of the progress of human intellectual endeavours to raise, by observation and experiment, a body of facts and phenomena to the status of true science, the reply to the latter question would be emphatically, Yes !

Anatomy, physiology, pathology, or a knowledge of deterioration of structures, to the minutest degree in which the microscope can show such changes for the worse, in the fluids and elementary tissues of organs ; chemistry, especially organic ; the nature and powers of medicines—in short, all those bodies of doctrine worthy of the name of science, and which bear upon the problem of life, must be cultivated—is possibly mastered—as the indispensable basis on which a lasting superstructure of a true science of medicine can be raised. Medicine can only become science by and through the subservient bodies of doctrine that have become science—the unknown must be reached by the known.

In every age, the individual who has effected most to raise medicine and surgery to the rank of sciences, has been the practitioner who was most distinguished for his knowledge of science.

John Hunter, besides being the greatest surgeon of his time, was the best physiologist, the greatest comparative anatomist, and, what was then little if at all known to his compatriots, he held the most advanced views of zoological classification, and was the most experienced palæontalogist.

In considering the obstacles that impede the progress of medicine to the scientific status, I have been led to regard in that light, among other opposing influences, "fees" and "examinations."

Taking poor human nature as it is, I suppose that, if the palæontologist were to receive his *honorarium* for every fossil he gave an opinion on, the number of mistaken determinations would be enormously increased. Were the chemist to make his analysis with a view to the fee, he would be diverted and led far astray from the tract of discovery. If the zoologist might claim and receive pecuniary reward for every new insect, shell, or worm, he might characterise, the number of "nominal species" would be vastly on the increase. Nature will not be bribed to reveal her secrets ; hardly will she, and rarely, reveal them under the torture of vivisectional experiment. She demands the full and entire devotion of her suitor, in long years of subservient observance ; and only to such single-minded worshippers of truth will she whisper a particle of it.

The physican who, in our day, has, perhaps, done most towards rendering medicine a science, is Rokitansky, through the very great proportion of his time devoted to the study of eleemosynary cases.

The same condition of advancement exists in the relations between the patients in hospitals and the medical officers. But for the entire range of maladies, in the various classes of society, one is disposed, in reference to the advance of medical science, to indulge in the Utopian desire of the devotion of some one adequately gifted in mental power and material wealth to the study of disease, exclusively with a scientific aim ; able to select his cases ; not necessarily diverted from a given and promising line of observation by the calls of remunerative practice.

Thus, in the same malady affecting different individuals under similar conditions of age, sex, temperament, or constitution, the effects might be compared, of the customary or accepted remedies in one case, of the remedies of an opposite kind—conditions of practice which in some instances now divide the medical mind—and of the withholding all medicines : just as the chemist, in quest of discovery alone, perseveres in the pursuance of the analyses of a particular class of compounds, his faculty of insight being sharpened in relation to them, by exclusive study and progressive familiarity with their specialties.

In reference to the second of the obstacles which it has occurred to me to specify, I do not mean "examinations" in the abstract; but the kind and conditions of those tests which more immediately affect the sciences—as taught, *e.g.*, in a school of medicine like St. Mary's—and the ultimate aim which the teachers have in view.

Examinations differ widely, in the work and qualifications of the examiners, in the views and motives of aspirants to the office, in the main end and aim of the test itself. In regard to the latter, the difference is such that it may be expressed by saying that some examinations are conducted to find how much, and others how little, a man knows. In the first category, those examined are ranked in the order of their acquirements; in the second, all alike receive a diploma, signifying qualification. And, as the weakest link in a chain gives the strength of the whole, so the scantiest measure of knowledge that enables the candidate to pass, becomes that of the amount sought for by the examiners, and at the same time a test of their own qualifications for the office, and of the responsibility and trouble which they undertake in its performance.

To exemplify the first kind of examinations, I would refer to the well-known arrangements at our old universities, in principle so pure, so effective in arrangements, as to gain for him in whom the highest amount of knowledge has been found, the unhesitating applause of the less successful, which is echoed, without the slightest misgiving, by the country at large.

In the composition of the examining body, old experience is combined with young vigour, soundest knowledge of settled principles, with minds fresh from the latest discoveries and amended views of science. The senior wrangler of one year may be associated with his teachers as an examiner in the next.

The machinery is effective without being cumbrous. There is no inducement to make it so. Four is the usual number of examiners. The administrative authorities of the university, responsible for the well working of the examination, impressed also by its supreme importance, have no other notion than to make it work well. They do not propose to themselves any personal advantage, in purse or dignity, by taking part in the work. They simply elect the best men for it. These, likewise, are moved by considerations far higher than the emoluments of the office; and indeed there are none. Such fee as may be offered and received simply nullifies the sense of obligation, on the part of the authorities, for the time and labour devoted by the examiners to the duties confided to them.

The annual lists of the results of the B.A. examinations at Oxford and Cambridge exemplify the operation of this system of examination, in discovering the relative amounts of knowledge in the candidates. The teachers of the required subjects are stimulated thereby to impart the newest discoveries, and to set intelligibly before their pupils the latest phase of their respective sciences. "Examinations" of this nature are helps, not hindrances, to science.

A board of examiners composed exclusively of old teachers or practitioners, and to whose diploma or pass-certificate the bulk of medical students look as a main aim of their metropolitan studies, becomes an influential element in the consideration of the way in which *e.g.*, anatomical and physiological science is to be presented by the teacher to his class. I believe that I do not err in supposing that, if the examinations in human anatomy and physiology by the board granting the diploma were conducted by a combination of young cultivators of those sciences with the experienced practitioner for the surgical department; that if one or more men of justly merited public repute for their advancement of anatomy and physiology, and in the vigour of their intellectual work of imparting and expanding those sciences, were placed on the board or "court" of examiners—teachers would be stimulated to prepare their pupils to be tested in relation to more advanced conditions of those sciences, than there is any call for under the present state of the "pass-examinations."

The obstacles to such improvement in the examining board may be exemplified in the conditions of its existence at the Royal College of Surgeons of England. The administrative authorities of that College are concerned, both in purse and dignity, in themselves performing the work of examination. In purse, by the way and degree in which they remunerate themselves for such work; in dignity, because no member of the Council is eligible to the offices of vice-president and president of the College until he has been an examiner. As such, his remuneration being in the ratio of the number of persons examined, must now be of material importance.* Accordingly, the Council, twenty-four in number, elect out of their own body ten to be examiners, reserving to themselves the testing in all the required sciences and subjects, save midwifery, dentistry, and classics.

I note this, therefore, as one of the impediments to the progress of medicine and surgery as sciences: an evil which will be abated in proportion as those to whom the profession confide administrative power may approach in singleness of purpose and motive to the administrative bodies of our universities, in regard to the business of examination for degrees and diplomas.

The Royal Society of Arts has recently given an example which the Royal College of Surgeons would do well to follow. On undertaking responsibilities connected with examinations of candidates, the Council of the Royal Society of Arts at once passed the self-denying ordinance that no member of the Council should be eligible to the post of examiner. Yet the Council always includes men well qualified for the office, but not every man so qualified, and seldom those who are best qualified.

[Professor Owen finally congratulated the students on the choice of their profession; comparing medicine with law, and with divinity as distinguished from religion; pointing out in this comparison the advantages of medicine in the opportunities it gave of acquiring and advancing knowledge of the various forms of the power of the Creator, in the greater freedom allowed in the use of the intellectual instrument,in the exclusively beneficent application of medical science, and the freedom from any calls of its professors to punish or persecute their fellow-men.]

* In the year 1817, the Council determined by bye-law, sect. xxii. that "Every member of the Court of Examiners, who shall be present at the opening of any stated Court of Examiners shall be entitled to half-a-guinea; every member, who shall be present at the adjournment thereof, shall also be intitled to half-a-guinea. And, for every exsmination for the diploma, the examiners, who shall have been present from the commencement until the termination thereof, shall be entitled to the division of nine guineas, whether the person examined be approved or referred."

St. Mary's Hospital Medical School.

DISTRIBUTION OF PRIZES, MAY 1st, 1866:

An ADDRESS by

PROFESSOR HUXLEY, F.R.S.

Mr. Dean, Ladies, and Gentlemen, the pleasing part of this business, so far as I am concerned, is now over, and another portion of the entertainment begins, which I trust may be in some sense satisfactory to you, but which has its difficulties for me. When the authorities of this school were first kind enough to honour me by asking me to preside on this occasion, I did not clearly take in and apprehend, as I ought to have done, the notion, that attached to that honour there was a certain responsibility in the shape of an address; but when I found that it was proper and customary that the person who had been favoured with the privilege of awarding these testimonies of merit and desert to young men should say something on his own behoof afterwards, I cast about in my mind for some subject on which I might be able to say something that might be possibly worth hearing, or, at any rate, that might express my own mature conviction, and might at the same time be of some use to those who are engaged in Medical pursuits. It appeared that on the whole I could not do better than say a few words touching the relations of the physical sciences in general to Medicine and of education in physical science to Medical education; and indeed, to make some remarks upon the whole subject of Medical education, which is now occupying so many minds and exciting so very large an interest among all the most intelligent members of the profession.

It is an old and trite observation that Medicine is both a science and an art; and if you put what you know about medicine into a homely phrase—I use the term "Medicine," as applying to the whole range of Physic, whether Surgical or Medical, or what not—I say, if you endeavour to put into homely phraseology what the object of the science of Medicine is, I think you will find it to be to ascertain the nature of the disability a diseased or injured person labours under, and in the next place to have a knowledge of the means by which that disability can be removed. And if you look for a definition of the art of Medicine, it has a correlative extent—in other words, the art may be defined as the skilful use of all those means and appliances by which we ascertain what is the matter with a man, and of those further means and appliances by which the wrong thing may be set right again. Now it hardly needs any remark upon my part to make you perfectly aware that the appliances of the art of Medicine are all of them derived from, or dependent upon, the physical sciences. I need only mention such instruments as the microscope and the ophthalmoscope, and that apparatus by which the chemical qualities of the fluids of the body are ascertained, to make it perfectly obvious that in order to make use of those great and familiar appliances of diagnosis (or finding out what is the matter with people), you must have a knowledge of chemical and of physical science. And although a knowledge of the principles of physical science, enough to enable you to use the microscope, and perhaps the ophthalmoscope, with some success may not be very great, yet if you would apply the methods of chemical analysis to the examination of the fluids of the body, your knowledge of chemistry must be tolerably practical and tolerably extensive. Further than that, every liberally educated Medical man should something about the nature of the bodies which he is constantly employing. It is, surely, not compatible with a liberal education that a Medical man should be employing quinine and not know that it is the produce of a plant and what kind of plant that is. It is hardly consistent with liberality of education that a man should employ musk and not even know that it is an animal product. And therefore I think, looking simply to the using of the appliances and means of Medical practice,, it may fairly be required that a Medical man should have so much knowledge of botany and zoology as shall simply for his own credit's sake and for the sake of his position in society, enable him to be on even terms with laymen, and that he shall know so much of botany and zoology as will enable him to give safe opinions upon matters of this kind.

On the other hand, the doctrine which I am now preaching has been pushed by some persons to a very extravagant length. I am quite prepared to admit, and, indeed, I have always had a very strong conviction that there is something absolutely preposterous in the volume and bulk to which some of our treatises on Materia Medica extend, and the enormous quantity of irrelevant matters with which their pages are crammed. I am not one of those persons who think that because you use spermaceti you are bound to know all about the classification of the *Cetacea.* I do not clearly see the connection between those things, nor do I think that a man is bound to be acquainted with physical optics—and I am not talking wildly now.I have a particular case in my mind,—I do not think a student should be dragged through the length and breadth of physical optics, because there are particular substances used in Medicine which affect the polarisation of light or exhibit the phenomena of fluorescence. That appears to be the Scylla we have to escape. The Charybdis we need to avoid, on the other hand, is the knowing nothing about these matters. So much for the relations of physical science to Medicine as an art—that is to say, to Medicine as the use of the implements and appliances which we employ in endeavouring to find out what is the matter with people and in removing their disabilities.

But there is a perfectly different aspect, and a very much more important one, under which physical science is related to Medicine. The relation to which I now refer is that in which Medical science—the science of Medicine as apart from the art—stands to physical science in general. And this relation is more close and more important and in every way more worthy of consideration than that other of which I spoke just now. Let us consider for a moment one of the simplest cases of disability—I want some word that shall apply both to Medical and Surgical lesions—which can be submitted to a practitioner. Supposing that a person unable to use his arm, the humerus being dislocated, presents himself to any one for cure, and that this person is no better than what we call in the country a bone-setter. The bone-setter knows, from his experience and from the general look of the part, that the arm is out of joint, and he knows very well, from experience also, that a particular mode of pulling that arm will probably get it to go back into its place again; whereupon he applies the pull, and, I suppose, three times out of the four the arm does go back. The fourth time, perhaps it does not go back, and cannot be got to go back; and the fifth time, it may be, in trying to make it go back, he does something or other which makes the matter very much worse than it was to start with. Now that is the proceeding of unscientific Medicine.

The scientific Surgeon, such as I hope all those who leave this School will be—and it certainly will not be the fault of their teachers if they are not—pursues a totally different course. The scientific Surgeon who has the same disability presented to him, in the first place calls into his mind the knowledge he has of anatomical science, and which tells him what has become of the head of that dislocated bone, where it is lying, by what obstacles its return to its place is impeded. He calls to his aid his previously acquired physiological knowledge, which tells him what influence muscular contraction is exerted in keeping that bone in its abnormal place—which teaches him to account for all sorts of symptoms—as the result of pressure on nerves, pressure on vessels, and so forth. And lastly, if necessary, he appeals to his knowledge of therapeutics, or in other words, of the influence of medicaments upon the condition of the parts of the body, and he applies them in such a manner as to diminish the obstacles which arise from the contraction of the muscles. In other words he makes use of the information he has acquired of the physical sciences Anatomy, Physiology, and Therapeutics, to serve as the basis of a series of deductions by the help of which the internal condition of the injured part becomes visible to the mind's eye. He knows, in virtue of these deductions, on what the bone is resting, what it is touching, what mischief it is doing, what means he ought to apply in order to bring the bone back into its primitive place, and what will be the effect of every measure which he applies for that purpose. In other words, in the case which I have selected, the scientific Surgeon knows precisely the character of the injury; and he knows precisely the kind of operation which he should perform to remedy that injury; and so far as this particular case is concerned, we may say that scientific Medicine has here attained its perfection—that is to say, the Practitioner may know the whole conditions of the lesion; and he may know exactly what he ought to do to restore the injured part to its healthy condition. And that is exactly the difference between the empiric and scientific man—that the empiric knows in a coarse, blind sort of way, —working in the dark on the doctrine of chances—that if he does certain things it is very likely certain results will follow. The scientific man, on the other hand, makes use of the data of physical science for the purpose of reasoning out the exact conditions of the case which he has before him, and for the purpose of applying the precise measures which are adapted to meet that case. I trust it is not necessary for me to use any argument to show you that it is this latter condition of mind to which the scientific Physician or Surgeon must strive, and that the labours of your teachers here are as so much lost if they have not carried you some steps towards that end.

Now, having this conception of what is meant by scientific Medicine before us, let us consider what has to be done before Medicine will reach this desirable condition. For although it may be possible to adduce instances of what I should call perfect Medical science—that is to say where you have a complete knowledge of the lesion, and a complete knowledge of the conditions required for the repair of that lesion—yet I need not tell you that these chiefly occur in Surgical practice, and are rarely presented to the Physician; and that in the great majority of purely Medical cases we have unfortunately, no such complete knowledge either of the lesion which has taken place, or of the steps which should be taken to restore health. In the great majority—I speak under correction here, but I do not think I shall be far wrong—in the great majority of cases the modern Physician, beneficent as his efforts are, great as his skill, and unremitting as his attention may be, yet as compared with that which is to be hoped for, and what we may fairly expect one day to attain, it must be confessed is still very much in the condition of the bone-setter. You know there is a wicked and libellous old story—I think some Frenchman invented it—in which it is said, by way of illustration of Medical practice, that in a diseased person Nature and the disease are as two men fighting; while the Doctor is a blind man, who comes with a big club and hits hard, sometimes hitting the disease, and sometimes hitting Nature. Now, there was a time when that description of Medical practice, I fear was not libellous, but the time has long since passed by when it could have any strict application, and it is not the fault of the cultivators of Medical science if it continues to have any sort of application. But, if I might modify this story and bring it more into accordance with the present state of things, I should say that, in these days, the Physician is not blind; but, on the contrary, is remarkably sharp-sighted, acute, and painstaking; but that he finds himself in a very dim twilight, and having ascertained that the light is very uncertain and very apt to vary, he rather, as a conscientious person, abstains from using his club, and as far as possible confines himself to the position which, if I may say so without offence to the ladies here, is known as that of a "judicious bottle-holder," ready to pick up nature whenever she gets adrift, and bring her up to time. That, I take it, is a fair description of the modern practice of physic; a statement in the vernacular of what is meant by our *Medicine expectante.* And no doubt a beneficent change has been brought about, satisfactory to the patient and no less satisfactory to the Physician, who feels that his club is not stained by innocent blood. But, although this may be a vast improvement upon the past condition of affairs, no one who knows what physical science is, or what men of science are thinking about, will imagine for one instant that it is to be a final condition. No one can doubt that the whole purpose of philosophical Medicine and the whole striving of philosophical Physicians must be to approximate Medicine more and more to the plainest kinds of Surgery, and to enable the Physician by-and-by to ascertain as clearly what is the condition of a diseased part, and what must be done to remove that disease; to have as clear a mental picture of that as the skilful Surgeon has of the condition of a dislocated bone, and of what is to be done to remedy the dislocation.

If you come to think of the matter, all disease is, strictly speaking, a dislocation—a something out of place. In the so-called "Medical" lesions, if it is not actually bone, and muscle, and viscera, in the gross, it is the atoms of these parts, and the molecules of the fluids, and so forth, which are not what they should be and where they should be, if the patient were in a condition of health. If our senses were so fine and so delicate as to enable us to see the ultimate molecules of the human body acting and inter-acting, we should discern that they were out of place in every diseased part; and if we had means of reaching them directly, we could put them back again into their right order, so as to produce their right functions, in just the same way as a Surgeon replaces a bone. To do this the Surgeon uses coarse mechanical power. He knows the bone is out of its place; his eyes give him an indication of where it is, or his hands. Touch and vision teach him what the condition of affairs is, and coarse mechanical methods are sufficient to enable him to bring matters right; but the atomic dislocation of a fever is not to be detected by touch or sight, and cannot be set straight by mechanical forces. The difference between the Surgeon and the Physician is not that they have different things to do, nor different methods of inquiry, nor that their procedure is in any way substantially different; but it is that the something which has gone wrong in Medical lesions requires special means for its discovery, and the forces which are to put that something right again cannot be applied directly and coarsely with our bodily hands, but we must send them to the dislocated atoms upon the shoulders of the atoms of those things which we call medicines, and drugs, and so forth.

To return to my old comparison,—to put the Physician into as favourable a position as the Surgeon, what he wants is simply more light. He wants better light upon the arena of the fight, so that he may be able to remove the obstacles in the way of Nature, and may be ready, as occasion offers, to deal her opponent a severe blow without the chance of doing herself an injury. And if you will take the trouble to reflect from whence such light may be expected, you will find that there is only one possible channel, and that is from the cultivation and improvement of those sciences which furnish us with our data for deduction. I mean the abstract physical sciences of anatomy, physiology, chemistry, physics, and so forth. Just as the Surgeon's knowledge of the nature of the dislocation of a bone is a deduction from previous anatomical knowledge—as his process of cure is a deduction from other kinds of scientific knowledge—so the discernment of the nature of all morbid processes must consist of a series of deductions from an enlarged physical and anatomical and chemical knowledge, and all our attempts to cure disease must be guided—all the light we get in that direction must be furnished to us—by a more subtle inquiry into the properties of the atoms of matter, and into the forces which they exert. Or in other words, the whole progress of Medicine depends upon the progress of physical sciences, from which her great principles are really deductions; and exactly in proportion as physiology, as anatomy, as pathology, as therapeutics are carefully studied and their principles better understood, so will the Physician have placed in his hands more and more powerful implements, on the one hand, for discerning the nature of the disease, and on the other hand for meeting and conquering that disease.

This is a large subject, one which, in these curt phrases, I can hardly put before you so fully as I could wish; but I hope that you see the bearing of what I have been saying, because it is upon a clear appreciation of this that all our theories of Medical education must eventually turn. If in striving to make medicine the noble and grand science it should be, all depends upon the perfection of certain other sciences; and if our skill in the use of the means of inquiring into disease and in using the means of cure depends upon our acquaintance with the physical sciences, it must be quite obvious to you that a thorough grounding in physical science is the basis of all Medical education. I believe that is a proposition which cannot be doubted, and which the more we inquire into it will be seen to go more and more completely into the root of the matter.

But how is such a grounding in physical science practicable? Not long ago one of the most experienced Surgeons in these islands raised his voice against the system which is at present pursued, in Medical education, in throwing into the system—if I may use Medical phrase—of a young man an enormous quantity of knowledge of all sorts of remote and theoretical kinds to the exclusion, as he justly enough observed, of that practical information which could alone in the long run make him a skilful Surgeon. And so far as I recollect, the argument ran somewhat in this way:—A young man leaves school; he comes to a Medical College, at which he is expected to spend three years; at the end of that time to become a practitioner, sent forth free to kill or cure as the case may be. He comes to you perfectly ignorant, without a scintilla of a notion of anything about science, and within that time you expect him to learn physics, or natural philosophy, chemistry, botany, zoology, with comparative anatomy, human anatomy, histology, pathology, therapeutics, Medicine, Surgery, obstetrics, jurisprudence. The thing is absurd. What you run a risk of doing is, to destroy his mental digestion, as you may destroy the physical digestion of a turkey, and make a sort of intellectual *foie gras* of him; but as for supplying information upon all those subjects of the kind and scope which he ought to have, in that time, and with the current methods, it is out of the question. Consider for a moment: if you take only those branches of Medical study which bear directly upon practice, few persons until they come to try know how vast they are. Take human anatomy, and reflect upon the quantity of work required before a student can possess the sort of knowledge that he ought to have And no one has a proper knowledge of human anatomy till the man who stands up before him is in a manner transparent, and all the essential organs, bones, nerves, vessels, and muscles are to the mind's eye visible in their places. Consider the knowledge of histology or the minute structure of tissue that is required. Take pathology in itself: the rudiments of it might, if they were studied thoroughly, occupy a very large share of the time. And then physiology is absolutely indispensable, and more especially that experimental physiology which is of more importance than all the rest. I say put these things together, and then superinduce upon them the practical branches of a Medical man's profession—the necessity of becoming dexterous in the use of bandages and the manipulation of instruments—and then all that a student has to learn in the way of theoretical Surgery, and Medicine, and Jurisprudence, and so forth. Why, it will be quite obvious that three years is a most scanty period to devote to all these subjects; it is as much as can be expected if in the three years, by dint of thorough teaching and zealous learning, a young man acquires a notion of the practical branches of his profession. I am not talking, of course, about the way that a man can be taught to pass an examination; anybody can be taught to pass an examination. I was almost going to say that a dog might be taught to pass an examination, or at least a good many of the examinations that men go through; but I speak of that kind of information which is alone worthy of being called knowledge—that information which, as I understand, your Professors here are doing their best to give you; that information which is conferred by making men go for themselves, at first hand, to the facts and see them, by leading them not to trust this teacher or that teacher, but to work out the truth and see it as it is, and carry that away as a thing that they know of themselves and of their own knowledge. That is the only knowledge that is to be depended upon in your future lives; and if a man is to have that kind of knowledge he cannot spare a minute out of his three years, for the subjects I have been speaking of just now.

But you may turn round upon me and say, "This is excessively inconsistent; for you have been preaching to us up to this time the enormous importance of abstract physical science, and telling us we can understand nothing unless we are well grounded in the principles of physics, in the principles of chemistry, and in the principles of biology." No, I have been guilty of no inconsistency. I hold absolutely to that position. I hold that no man can have a proper knowledge of physiology, no man can understand what the Scotch well call the "Institutes of Medicine," unless he has gone back still further, and unless he has acquainted himself with the general laws of the physical forces of, and with the general powers of matter as revealed by, chemistry and biology.

The fact is, that you ought to have this general knowledge of physical science before you approach the study of Medicine. I fully concur with the distinguished Surgeon to whom I refer, that these are not the matters with which a man ought to be occupied when he is busy with his practical Professional education. In other words, if we could arrange things as they ought to be, all this general knowledge of physical science, all this acquaintance with the principles of physics, and chemistry, and biology, ought to have been acquired by you in the course of your ordinary education. If those who regulate education in this country had a right conception of what their duties are, or of the purpose of education and the conditions of the progress of mankind at this present time you would get that knowledge. And those who wish to improve Medical education must, to my mind, throw all their energies into the attempt to compel those who give us primary education to make physical science a very large constituent portion of that education. I thoroughly sympathise with those who groan over the present chaotic condition of affairs. I do not see how, for some time, we are to escape the attempt to force upon young men who come to learn Physic too much knowledge and too various knowledge. Perhaps, even, it is better they should have the kind of chaotic training they have now, than that they should be altogether free from a tincture of physical science; therefore I do not in the smallest degree blame the existing system of instruction in Medical Schools. I think the attempts which are being made in all the great schools of London to make physical science an integral part of Medical teaching are necessary so long as physical science is ignored in ordinary education. The effort is good; the evils which attend it must be met as best they may. But I repeat once more, the great effort of all Medical reformers must be to make such a pressure upon those who have the charge of education in the country that physical science shall be made an integral part of it. If that were the case,—if men came to their Medical studies trained not only in the facts of physical science, for that is only half the battle, but if the precious time which is now wasted in gerund grinding at school were even partially employed in accustoming them to the methods of scientific inquiry, the task of the Medical teacher would be infinitely lightened. If a knowledge of classical literature, or an appreciation of literary excellence, were really given at our schools, I should be the last person in the world to cry out against it, for I yield to no man in my respect and love for literature. But let any one of us turn back to his school-days, and let him try to call to mind what enduring result he obtained from all the Greek and Latin teaching he got at school. What was the whole effect? It was a pervading sense of nominative cases, and verbs, and so forth, to the end of the chapter. We read our Virgil, and Horace, and the rest of it, and when we had done, all that we knew was that they were made up of verbs and substantives which had certain quantities and were packed together in accordance with certain rules; and as to what the whole thing meant, unless you were more fortunate than I, we had not the smallest notion of it.

It is the duty of every man to lift up his voice against this strange waste of human time and perversion of human ability; and it is the especial duty of every one of us who has the cause of Medical education at heart to endeavour, as far as possible, to exercise such an influence upon the general education of the country as shall relieve Medical education from three-fourths of the difficulties under which it at present labours; and to bring about the great result that, when the Medical teacher begins his work, he shall not have to commence that work upon a mere *tabula rasa*, a mere raw material which has been used for no better purpose than gerund grinding Conceive how different the case would be if the young men who come up for Medical education had been accustomed to handle physical experimental apparatus. Suppose that they had been accustomed to acquaint themselves with chemical formulæ, with chemical reactions? suppose they had learned, and there is no difficulty in learning these things, the great distinguishing characters of the different forms of life, and the great broad facts of physiology, which (I speak from experience) may be taught perfectly well to boys of from ten to fourteen years old; I say, supposing they had done this, and that they came to the study of Medicine with their minds stored with important truths, accustomed to go back to facts at first hand, and disciplined in the methods of inductive and deductive reasoning, how much easier the task would be, not only for the learner but for the teacher, and how vastly greater would be the stride made by every man towards that great goal I have already indicated—the establishment of a scientific Medicine.